

## CLAIMS

What is claimed is:

1. An antenna for use in a wireless communication system, the antenna comprising:  
a housing having a dome shaped exterior portion thereof;  
5 a focusing transreflector consisting of a conductive grating disposed along a surface of the dome and further defining an axis for the antenna, the orientation of the conductive grating such that radiation having a particular polarization passes through the conductive grating and radiation of other polarizations is reflected by the conductive grating; and  
10 a twist reflector substantially centered along the axis and located at a distance away from the transreflector such that the twist reflector reflects received radiation back towards the focusing transreflector and imparts a polarization to the received radiation thereby reflected so that the focusing transreflector causes the reflected and polarized radiation to be focused along the  
15 axis.
2. An antenna as in claim 1 wherein the conductive grating is formed on an interior surface of the dome.
3. An antenna as in claim 1 wherein the conductive grating is formed of a plurality of parallel conductors with a spacing typically less than one-fifth of the  
20 wavelength of a carrier frequency used in the wireless communication system.
4. An antenna as in claim 1 wherein the twist reflector further comprises:  
a metal plate having grooves formed in a surface facing the conductive grating.

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5. An antenna as in claim 1 wherein the twist reflector further comprises:  
a metal backed dielectric layer, the dielectric layer having grooves  
formed therein to impart the polarization.
6. An antenna as in claim 4 wherein the grooves formed in the metal plate have a  
depth of about one-quarter of the wavelength of a carrier frequency used in the  
wireless communication system.
7. An antenna as in claim 4 wherein approximately one to three grooves are formed  
in the twist plate per wavelength of a carrier frequency used in the wireless  
communication system.
8. An antenna as in claim 1 wherein the twist reflector further comprises:  
a metal-backed dielectric layer with conductive grating created on its  
forward surface.
9. An antenna as in claim 1 wherein the twist reflector is additionally formed on an  
external face of a housing in which are enclosed a radio transceiver for receiving  
microwave data signals on a carrier frequency.
10. An antenna as in claim 8 wherein the twist reflector further serves as a heat sink  
for electronic components of the radio transceiver.
11. An antenna as in claim 1 wherein a feed point is disposed at the twist reflector  
along the axis of reception.
12. A radio unit for use in a wireless communication system using microwave radio  
carrier frequencies, the radio unit comprising:  
an antenna additionally including:

a housing having a dome shaped exterior portion thereof;

a focusing transreflector consisting of a conductive grating disposed along a surface of the dome and further defining an axis for the antenna, the orientation of the conductive grating such that radiation having a particular polarization passes through the conductive grating and radiation of other polarizations is reflected by the conductive grating;

a twist reflector substantially centered along the axis and located at a distance away from the transreflector such that the twist reflector reflects received radiation back towards the focusing transreflector and imparts a polarization to the received radiation thereby reflected so that the focusing transreflector causes the reflected and polarized radiation to be focused along the axis;

a feed point disposed at the twist reflector along the axis, and arranged to couple transmit energy to the antenna and to couple receive energy from the antenna;

a microwave transceiver, arranged to couple microwave modulated transmit signals and receive signals to the antenna through the feed point; and

a modem, arranged to provide modulated data signals to the transceiver, and to provide demodulated data signals at an output thereof.

13. A radio unit as in claim 12 wherein the conductive grating is formed of a plurality of parallel conductors with a spacing typically less than one-fifth of the wavelength of the microwave carrier frequency.

14. A radio unit as in claim 12 wherein the twist reflector further comprises:

a metal plate having grooves formed in a surface facing the conductive grating.

15. A radio unit as in claim 14 wherein the grooves formed in the twist plate have a depth of about one-quarter of the wavelength of the microwave carrier frequency.
- 5 16. A radio unit as in claim 14 wherein approximately one to three grooves are formed in the twist plate per wavelength of the microwave carrier frequency.
17. A radio unit as in claim 12 wherein the twist reflector further comprises a metal backed dielectric layer with a conductive grating created on its forward side.
18. A radio unit as in claim 12 wherein the twist reflector is additionally formed on an external face of a housing in which are enclosed a radio transceiver for receiving microwave data signals on the microwave carrier frequency.
- 10 19. A radio unit as in claim 18 wherein the twist reflector further serves as a heat sink for electronic components of the transceiver.
20. A radio unit as in claim 12 wherein the feed point is disposed at the twist reflector along the axis of reception.
- 15 21. A method for making an antenna for use in a wireless communication system, the antenna comprising:
- a housing having a dome-shaped exterior portion thereof;
  - a focusing transreflector consisting of a conductive grating disposed along a surface of the dome and further defining an axis for the antenna, the orientation of the conductive grating such that radiation having a particular polarization passes through the conductive grating and radiation of other polarizations is reflected by the conductive grating; and
  - a twist reflector substantially centered along the axis and located at a
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distance away from the transreflector such that the twist reflector reflects received radiation back towards the focusing transreflector and imparts a polarization to the received radiation thereby reflected so that the focusing transreflector causes the reflected and polarized radiation to be focused along the axis;

wherein the method for making such a transreflector comprising the steps of:

- (a) forming on one surface of a synthetic resin carrier film a series of spaced parallel patterns of a conductive material;
- (b) placing said film on the surface of a mold defining the desired concave internal curve for the transreflector; and
- (c) assembling over said film in said spaced relationship a second mold half having the desired convex external curve for the transreflector, said housing providing a mold cavity.

22. A method as in claim 21 additionally comprising the step of:

allowing a carrier substrate to remain integral to the resulting molded transreflector article.

23. A method as in claim 21 additionally comprising the step of:

introducing a fluid synthetic resin into said mold cavity to form the desired transreflector element with said spaced parallel stripes disposed on an internal concave surface thereof.

24. A method of making a transreflector according to claim 21 in which the resin of the carrier film is a low loss dielectric.

25. A method of making a transreflector according to claim 21 wherein the resin of said carrier film is a polyester.

26. A method of making a transreflector according to claim 21 wherein the transreflector element is a generally circular configuration.
27. The method of making a transreflector according to claim 21 wherein the step of forming spaced parallel stripes comprises physical vapor deposition of a metal.
- 5 28. A method as in claim 21 wherein the step of forming the conductive pattern comprises the steps of etching a conductive substrate.
29. A method as in Claim 28 in which the conductive substrate is pad printed or silk screened.
- 10 30. A method of making a transreflector as in claim 21 wherein the step of forming the conductive pattern on the substrate comprises etching a pre-clad material.